

Gravina Access Project

Effects on Cruise Ship Operations

Draft



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Table of Contents

1.0	Introduction and Purpose.....	1
2.0	Background	2
2.1	Introduction.....	2
2.2	Cruise Ship Traffic Projections	2
2.3	Cruise Ship Company Interviews	7
2.4	Cruise Ship Running Times	7
3.0	Effects on Cruise Ship Operations	9
3.1	General Effects on Cruise Ship Operations	9
3.2	Effects of C3a, and C4 (High Bridges).....	10
3.3	Effects of C3(b) and D1 (Low Bridges)	10
3.4	Effects of F3 (Pennock Island Crossing)	16
4.0	Effects on Passenger Activities and Other Revenues	22
4.1	Background	22
4.1.1	Cruise Ship-Related Spending On Shore	22
4.2	Effects of Passenger Activities and Other Revenues	23
4.2.1	Effects on Passenger Activities and Other Revenues of No-action, G2, G3 and G4 Alternatives.....	23
4.2.2	Effects on Passenger Activities and Other Revenues of C3(a) and C4	23
4.2.3	Effects on Passenger Activities and Other Revenues of C3(b) and D1 – Low Bridges	23
4.2.4	Effects on Passenger Activities and Other Revenues of F3	25
5.0	References	28

List of Tables

Table 2-1	Sailing Time between Juneau and Ketchikan 2001 Cruise Season	8
Table 2-2	Length of Port Call Ketchikan 2001	8
Table 2-3	Usable Port Hours	9
Table 3-1	Cruise Ship Access to Port Facilities for the GAP Alternatives.....	10
Table 3-2	Analysis of Sailing Time between Juneau and Ketchikan Using Maximum Cruising Speed Alternatives C3(b) and D1 – Low Bridges	11
Table 3-3	New Port Call Length – Northbound (NB) and Southbound (SB) Voyages Alternatives C3(b) and D1 – Low Bridges.....	11
Table 3-4	Lost Port Calls – Northbound Sailings Alternatives C3(b) and D1 – 120’ Bridges at the Low, Base, and High Cases	13
Table 3-5	Lost Port Calls – Southbound Sailings Alternatives C3(b) and D1 – 120’ Bridges at the Low, Base, and High Cases	14
Table 3-6	Total Lost Port Calls Alternatives C3(b) and D1 – 120’ Bridges at the Low, Base & High Cases (with 2001 as base year).....	14
Table 3-7	Total Lost Port Time for Alternatives C3(b) and D1 – 120’ Bridges at the Low, Base & High Cases (with 2001 as base year).....	14
Table 3-8	Additional Fuel and Associated Costs for Alternatives C3(b) and D1-120’ Bridges.....	15
Table 3-9	Additional Fuel Costs for Alternatives C3(b) and D1 – 120’ Bridges	15
Table 3-10	Tugboat Assistance Alternatives C3(b) and D1 – 120’ Bridges.....	16
Table 3-11	Summary of Effects on Cruise Ship Operations Alternatives C3(b) and D1- 120’ Bridges	16
Table 3-12	Analysis of Sailing Time between Juneau and Ketchikan for Alternative F3- Pennock Island Crossing	17
Table 3-13	Port Call Length – Northbound/Southbound Voyages	17
Table 3-14	Lost Port Calls – Northbound Sailings Low, Base, and High Cases-Alternative F3.....	18
Table 3-15	Lost Port Calls – Southbound Sailings - Low, Base, and High Cases-Alternative F3	19
Table 3-16	Total Lost Port Calls Low, Base & High Cases – Alternative F3	20
Table 3-17	Total Lost Port Time Low, Base & High Cases – Alternative F3	20
Table 3-18	Additional Fuel and Associated Costs Alternative F3 – Pennock Island Crossing	20
Table 3-19	Additional Fuel Costs Alternative F3 – Pennock Island Crossing	21
Table 3-20	Tugboat Assistance Alternative F3 – Pennock Island Crossing.....	21
Table 3-21	Summary of Effects of Alternative F3	22
Table 4-1	Estimate of Cruise Ship-Related Spending Per Port Call	22
Table 4-2	Potential Revenue Losses Low, Base, and High Cases – Alternatives C3b and D1	23
Table 4-3	Estimated Passenger Spending by Hour	24
Table 4-4	Estimated Passenger Spending by Hour	24
Table 4-5	Passenger Revenue Losses with Reduced Port Time for Alternatives C3(b) and D1	25
Table 4-6	Summary – Passenger and Other Revenue Losses 2001 Base Year- Alternatives C3(b) and D1.....	25
Table 4-7	Potential Revenue Losses Alternative F3 – Pennock Island Crossing	26
Table 4-8	Passenger Revenue Losses with Reduced Port Time Alternative F3- Pennock Island Crossing	26
Table 4-9	Summary – Passenger and Other Revenue Losses Alternative F3- Pennock Island Crossing	27

List of Figures

Figure 2-1	Estimated Annual Cruise Ship Capacity for Cruise Ships Calling at Ketchikan.....	3
Figure 2-2	Estimated Ketchikan Cruise Ship Calls.....	4

1.0 Introduction and Purpose

The Alaska Department of Transportation and Public Facilities (DOT&PF) through the Gravina Access Project is endeavoring to improve access to Gravina Island from Ketchikan, Alaska – the main population and commercial center in southern Southeast Alaska. Numerous bridge, tunnel, and ferry options were considered, including the no-action alternative. Nine alternatives, including the no-action alternative, were selected in the fall of 2000 for more detailed study from the many alternatives considered.

The purpose of this memorandum is to explain the possible primary effects of nine access options on the cruise ship industry and the indirect effects of those options on the cruise lines and the Ketchikan community. The effects of the various bridge options derive from the fact that two of the bridge alternatives provide 120 feet of air draft (clearance) that prevents the passage of large cruise ships through Tongass Narrows, necessitating routing changes, additional maneuvers, tug boat assistance, reduced port time, and higher cruising speeds (and fuel costs) to regain time lost entering or leaving the Ketchikan dock area. Because the potential loss of port time may reduce time available for shore excursions, cruise ships calling at Ketchikan may realize less revenue from the on-board sale of shore excursions and attractions. As a result, the cruise lines may choose to reduce port calls in Ketchikan in favor of longer and potentially more profitable port calls in Juneau, Skagway, or other ports.

To assess the potential impacts to the cruise industry, a number of tasks were undertaken, beginning with a review of historical cruise ship industry growth in Ketchikan, followed by a projection of that growth into the future. A detailed survey of the major cruise lines calling in Ketchikan was conducted to understand the operational aspects of entering and leaving the Ketchikan port as well as operations between Ketchikan and Juneau. Part of this survey was a detailed inquiry of marine operations officials into the impact of the various access options on ship movements. Cruise line officials with authority over shore excursion sales and related matters were also questioned to assess the effect of lost port time on operations and how companies might react to those potential economic impacts.

The information and data gathered in these and related researches provided the bases for assumptions used in section 3.0 *Effects on Cruise Ship Operations*. These assumptions allowed the study team to estimate the potential number of port calls that might be affected by various Gravina access options and estimate the cost of any required increase in running speed and additional tug assists.

In section 4.0 *Effects on Passenger Activities and Other Revenues*, the estimates developed in section 3.0 were used to calculate the reduction in shore spending by passengers and crew, and the revenue loss to the port and other enterprises as a result of reduced expenditures by the cruise lines themselves. These calculations were based on prior detailed research into passenger, crew, and cruise line expenditures in Ketchikan.

2.0 Background

2.1 Introduction

The various Gravina Access Project alternatives will have a range of effects on the operations of cruise ships. In order to better understand the potential effects of each alternative, project team members prepared preliminary analyses studying various types of effects on cruise ship operations. This section provides a summary of this analysis. Specific details can be found in the documents referenced.

Several tasks were completed in order to understand how cruise ship operations could be affected by various crossing options. One task involved projections of cruise ship traffic to Ketchikan assuming no impacts on the operation of cruise ships for the study period. The full analysis of the cruise ship projections can be found in the memo “Cruise Ship Traffic Projections Technical Memorandum”, by Glosten Associates, dated September 2001.

A second task consisted of detailed interviews with cruise line executives responsible for making cruise ship deployment and itinerary decisions. A third undertaking was a detailed survey distributed to cruise ship masters (ship captains) on the Alaska route during June 2001. Results of these latter two tasks are included in three internal memos from Klugherz & Associates to Northern Economics and HDR Alaska, Inc, dated May 31, 2001, July 28, 2001, and September 8, 2001.

Following the cruise line interviews and surveys completed by Klugherz & Associates, Glosten Associates, Inc., prepared a refined analysis of additional sailing and maneuvering time caused by each access option for ships traveling between Ketchikan and Juneau, the most typical cruise itinerary. The results of this analysis are found in an internal fax memo from Glosten Associates to HDR Alaska, Inc., dated August 29, 2001.

2.2 Cruise Ship Traffic Projections

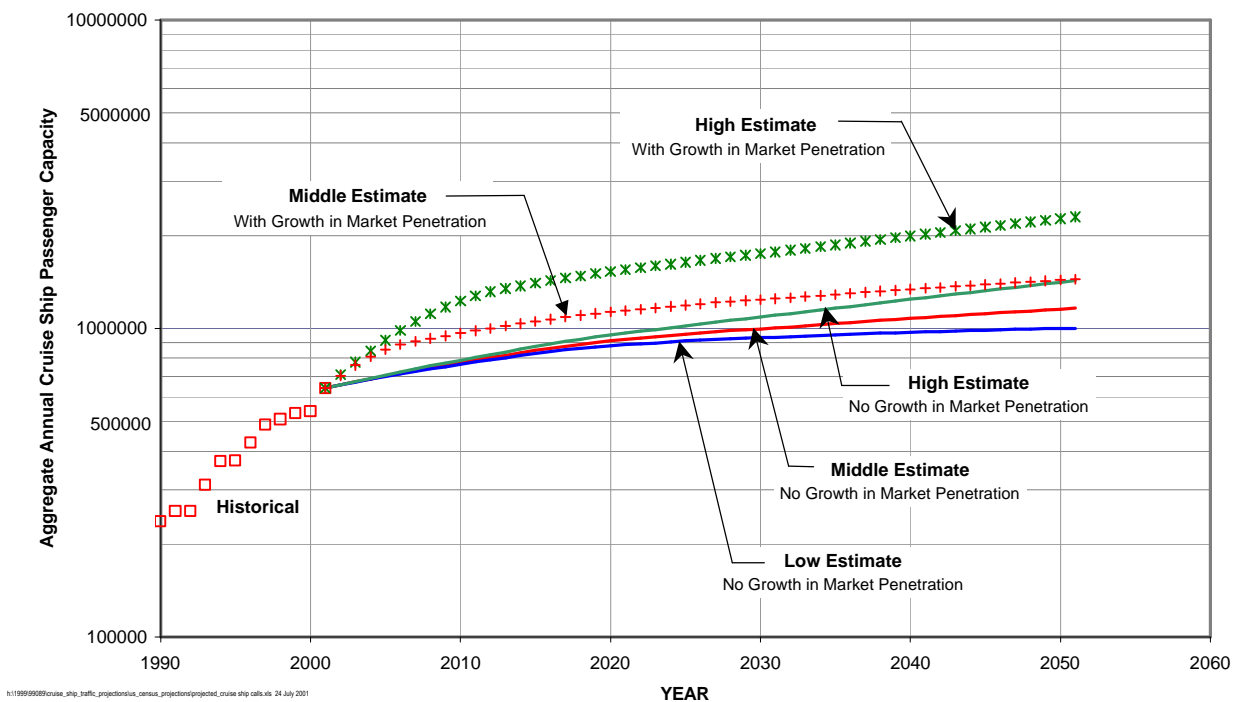
In a memo prepared prior to September 11, 2001, Glosten Associates, Inc., provided cruise ship traffic projections for Ketchikan through 2050. These projections are based on an analysis of historical cruise ship traffic to Ketchikan, population growth estimates provided by the U.S. Census Bureau, and international population trends. Two base assumptions underlie the cruise ship passenger and port call projections: The first assumption, used in three projections, is that cruise ship market penetration by age remains constant at 1999 levels. The second, used in two projections, is that the pattern of growth in cruise ship market penetration over the past decade continues.¹

The following is an excerpt from that memo that outlines cruise ship passenger capacity projections. Figure 2-1.

¹ Glosten Associates, Inc., *Cruise Ship Traffic Projections Technical Memorandum*, Draft, September 2001, pg. 5-1.

... depicts five different projections of the minimum aggregate annual cruise passenger capacity calling at Ketchikan. The high estimate with growth in market penetration exceeds one million passengers beginning in 2007 and two million passengers beginning in 2041 (note the logarithmic scale for passenger capacity). The middle estimate with growth in market penetration exceeds the one million mark beginning in 2012. In the absence of any further growth in market penetration, the one million passenger mark is passed in 2024, 2031 and 2051, respectively, by the high, middle, and low estimates.²

Figure 2-1. Estimated Annual Cruise Ship Capacity for Cruise Ships Calling at Ketchikan



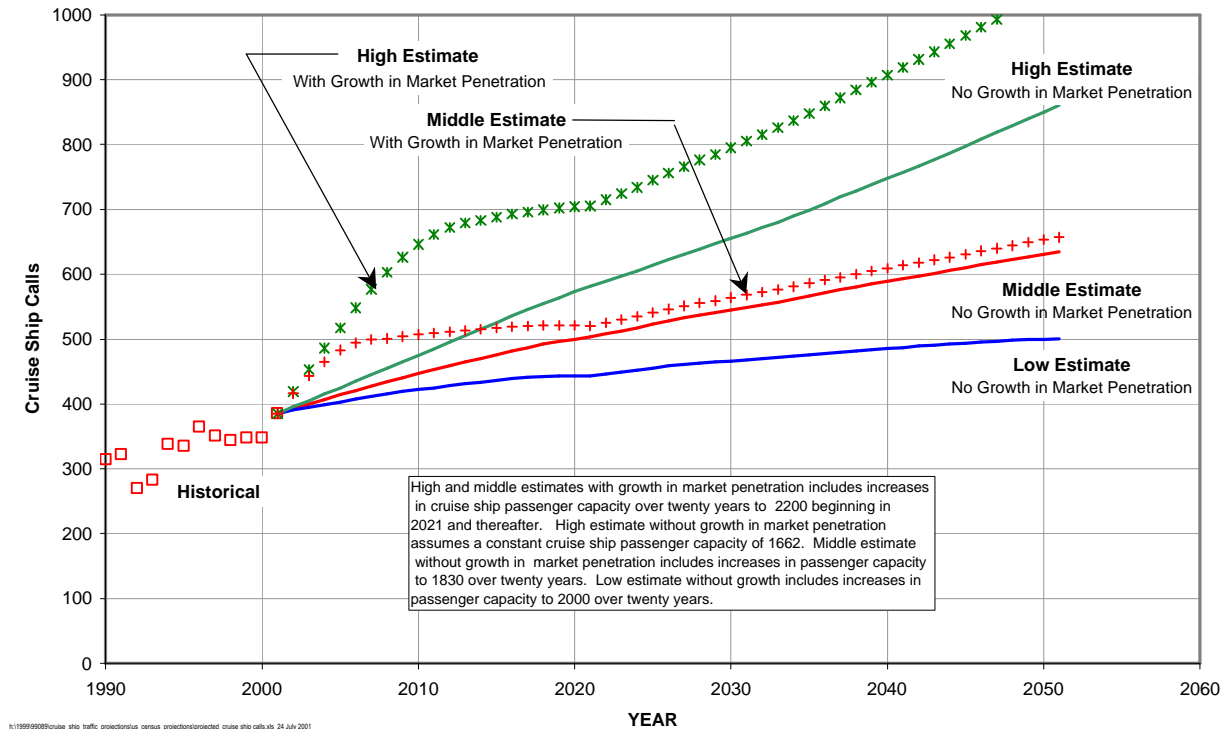
The following excerpt from the memo outlines cruise ship port call projections presented in Figure 2-2:

The high-series estimate with growth in market penetration exceeds 700 large cruise ship calls annually by 2019. The middle-series estimate with growth exceeds 500 large cruise ships by 2008, while the middle-series without growth achieves 500 by 2020. The high-series estimate without growth exceeds 700 calls by 2036. Figure [2-2] depicts estimated cruise ship calls in Ketchikan from 1990 to 2051.³

² Ibid, pg. 6-1.

³ Ibid., pg. 6-2.

Figure 2-2. Estimated Ketchikan Cruise Ship Calls



The Glosten memo concludes with the following:

High, middle, and low estimates of future large cruise ship traffic calling at Ketchikan, Alaska, have been developed, based on cruise ship demographic data, population projections, and historical market analysis. Planned large cruise ship traffic in 2001 comprises 385 port calls. The projections are for the period 2001 to 2051 and vary in 2051 from a low of 501 port calls to a high of 1,045, as shown in Figure [2-2].

A number of factors have been considered that might potentially limit the projected growth in cruise ship traffic. These factors are passenger income, limited cruise ship berthing space, resident resistance to increased tourism, inadequate growth in destination attractions, competition from other destinations, and large-ship traffic congestion in Tongass Narrows. It is concluded that passenger income, and large-ship traffic congestion in Tongass Narrows are unlikely to inhibit the projected growth in large cruise ship traffic.

On the other hand, it was determined that availability of cruise ship berthing space may already be limiting large cruise ship traffic, and that the limited availability of cruise ship berthing space will certainly limit future growth in large cruise ship traffic unless additional berthing space is provided.

Four factors are judged to have the potential to limit future large cruise ship traffic below projected levels:

- Limited cruise ship berthing
- Inadequate growth in destination attractions and services
- Competition from other destinations
- Tolerance of residents to growth in tourism.

Excepting resident resistance to increased tourism, each of these potential limiting factors can be mitigated by appropriate investment by local, regional, and state interests, such as:

- New cruise ship berthing
- Increasing floatplanes, charter vessels, helicopters, buses, hotels, and other destination attractions and services
- Market promotion to cruise lines and to the traveling public
- In Tongass Narrows, it is concluded that one-way traffic is feasible for all foreseeable levels of cruise ship traffic. However, congestion of cruise ships maneuvering in Ketchikan Harbor would be exacerbated by any low bridge across East Channel.⁴

Projections and Variability: Since the preparation of the cruise ship projections for the Gravina Access Project there have been major developments on the world economic and political scenes. The September 11, 2001 attack on the World Trade Center in New York and the Pentagon in Washington, D.C. has set off a chain of events that could have an effect on the travel industry, and more specifically, the Alaska cruise ship industry. The issues directly affecting the Alaska cruise ship industry are the economic downturn and fear of travel, particularly air travel.

The U.S. economy had been in a slowdown prior to September 11, 2001. However, following the attacks on the World Trade Center economic analysts have generally concluded that the U.S. economy was in a recession. During periods of recession, consumer spending is lower and consumers put off expenditures on discretionary items such as travel.

In addition to a recession, the fear of air travel may create some uncertainty for future growth projections of cruise traffic. In response to the attacks on September 11, 2001, cruise lines immediately redeployed ships from ports and regions with high terrorism risk and areas where Americans may not want to travel. Additionally, cruise lines are more interested in using U.S. home ports to base ships, making it possible to drive to many cruise departure points. As a result, in 2002, at least two additional ships are being redeployed to Alaska.⁵

⁴ Ibid, pg. 8-1.

⁵ Holland America announced changes in 2002 deployments and will position the *Amsterdam* to sail to Alaska from Seattle. Celebrity Cruises will reposition one ship from the Mediterranean to Alaska.

Further, several cruise lines are laying up ships for periods of time, are delaying the introduction of new ships, and are delaying exercising option agreements to build new ships. The uncertainty in the travel marketplace has also adversely affected the health of financially unstable cruise lines, resulting in the bankruptcy of one cruise line in late September. However, cruise industry analysts suggest that the growth in cruise capacity projected for the North American cruise industry overall will continue in the near term. According to one source, 2001 capacity was expected to grow by 6.4 percent, 2002 capacity by just under 8.0 percent, 2003 capacity by 11%, and 2004 by 6.6 percent.⁶

The projected growth in cruise capacity in North America, coupled with the current economic conditions and fear of travel, suggests that the cruise industry will need to make extraordinary efforts to fill ships. In general, cruise lines will schedule ships to destinations that are perceived as safe and easy to reach and cruise prices will likely drop. It is likely that Alaska will benefit from this situation. The primary market for Alaska cruises comes from the United States, and Alaska may be perceived as a safer cruise destination than other parts of the world. In addition, the two primary home ports for Alaska cruising are easily accessible by road and rail for much of the potential market, precluding the need for air travel. Finally, lower prices for Alaska cruises will expand the market.

How long this growth resulting from the current conditions will last is unknown. In 1985, following a terrorism act aboard a cruise ship in the Mediterranean, Alaska experienced rapid growth in cruise passengers that continues to this day. Americans did not return to the Mediterranean for a few years. During the Gulf War, ships were also repositioned from the Mediterranean and it was two years before Americans returned to cruise in the region, according to one cruise line executive.⁷

Another recent development in the cruise world involves the proposed merger of two of the three largest cruise lines in the world, P&O Princess and Royal Caribbean International. These combined companies would make the largest cruise group in the world. Together they will offer three different market brands and each with a strong presence in Alaska. At this time there is uncertainty as to how this merger might affect the deployment of ships to Alaska in the future, but both companies also have extensive ground tour operations and, therefore, have demonstrated a long-term commitment to the destination. However, in the near term, no real changes are expected from these companies in Alaska.

The current economic and political conditions will continue to play a role in the future growth of Alaska as a cruise destination. A higher degree of variability in the growth projections presented could occur, at least in the short term, with the middle to high case projections more likely. It is expected, however, that the longer-term trend will be one of sustained growth as presented in the low, middle, and high cases in the Glosten memo.

⁶ Cruise Industry News, Oct. 15, 2001.

⁷ Ibid.

2.3 Cruise Ship Company Interviews

Detailed interviews with nearly every cruise line visiting Alaska in 2001 were conducted. In total, the seven cruise lines for which interviews were completed represent 97% of total passenger capacity in Alaska for 2001. In addition, a handful of detailed surveys were completed by cruise shipmasters aboard ships sailing in Alaska waters for 2001.

The results of these interviews and surveys included statements of the various effects of the different crossing options. One effect is the additional time necessary for cruise ships to sail around Gravina Island should unrestricted access to the Tongass Narrows be blocked by different bridge alternatives. Another effect is the additional maneuvering that might be needed with various other approaches to the port facilities in Ketchikan. The cruise lines provided estimates of the additional time needed to approach from various directions and maneuver to reach the docks. The May 31, 2001 memo included a preliminary analysis of the information provided by the cruise lines and a limited analysis of the potential financial impact of the 120 feet high bridge alternatives. The interviews were summarized in that memo and a preliminary analysis of potential impacts was presented. The information in that memo was intended as a starting point for analysis.

2.4 Cruise Ship Running Times

Sailing time between Ketchikan and other ports is critical in determining the effects on cruise ship operations by various access alternatives. Table 2-1 reviews the sailing time between Ketchikan and Juneau, the most common itinerary in Southeast Alaska.

The following was noted in the August 28, 2001, *Memo – Running time and Other Impacts on Large Cruise Ships* from Glosten Associates, Inc. to HDR Alaska, Inc.:

The 2001 Ketchikan cruise calendar delineates 104 northbound port calls by large cruise ships and 282 southbound port calls by large cruise ships, for a total of 386 port calls (27% northbound and 73% southbound, overall). Of these 95 northbound calls at Ketchikan proceed next to Juneau and 94 southbound calls arrive directly from Juneau. The sailing distance for large vessels operating between Ketchikan and Juneau (cruise ship dock to cruise ship dock) is 300 n.m. via Tongass Narrows, Clarence Strait, Sumner Strait, around Cape Decision, thence up Chatham Strait to Frederick Sound, and thence Stephens Passage and finally Gastineau Channel. Of this distance, approximately 4.5 n.m. are slow sailing waters (\approx 3.5 n.m. in Tongass Narrows restricted to 7 knots and approximately the final nautical mile leading to the Juneau cruise ship dock). Approximately 15 minutes must be allowed for casting off and getting underway. And likewise 15 minutes must be allowed for maneuvering to berth and making fast. Making these allowances a mean transit speed can be computed for each vessel calling at Ketchikan that is either arriving from or departing to Juneau.⁸

⁸ The nomenclature n.m. in the memorandum refers to nautical miles.

Using the 2001 cruise season as a base year, the average sailing time between the two ports when going northbound (Ketchikan to Juneau) was 16.56 hours. For southbound voyages the trip is slightly shorter, on average. Average speed is calculated and compared with the maximum cruising speed. Maximum cruising speed is estimated as 90% of the maximum sea speed.⁹ The above referenced memo concludes the following:

In any event, it can be seen that the large cruise ships are currently operating between Ketchikan and Juneau at approximately 95% of estimated maximum cruising speed. Given that the average estimated maximum cruising speed is somewhere between 19.99 and 20.29 knots, the remaining 5% corresponds to approximately one knot (i.e., they are operating about one knot less than the estimated maximum cruising speed in 2001). On the run between Ketchikan and Juneau this extra one-knot might be expected to decrease running time by about 46 minutes.¹⁰

Table 2-1. Sailing Time between Juneau and Ketchikan 2001 Cruise Season

2001 Cruise Season	Average Hours between KTN/JNU	Average Speed (knots)	Percent Max. Cruising Speed (knots)	Max. Cruising Speed (knots)	Full Sea (knots)
Ketchikan TO Juneau	16.56	19.20	94.65%	20.29	22.54
Averages – 95 trips					
Juneau TO Ketchikan – 94 trips	16.49	19.29	96.46%	19.99	22.21

Source: Running Time and Other Impacts on Large Cruise Ships, Fax Memo to HDR Alaska, Inc., Glosten Associates, August 28, 2001

An analysis of port time is presented in Table 2-2. The average port call is just over eight hours, with northbound ships staying one-half hour longer than southbound ships.

Table 2-2. Length of Port Call Ketchikan 2001

Length of Port Call in 2001	Total Ship Calls	Northbound Calls	Southbound Calls
6.5 hours or less	23	1	22
6.6 to 7.5 hours	86	7	79
7.6 to 8.5 hours	142	62	80
8.6 to 9.5 hours	111	25	86
9.6 hours or longer	23	9	14
Total Port Calls	385	104	281
Total Port Hours	3,140.1	881.8	2258.3
Mean Port Call	8.14	8.48	8.04
Median Port Call	8.00	8.50	8.00

Source: 2001 Ketchikan Cruise Ship Calendar, Ketchikan Visitors Bureau

⁹ Ibid., pg. 3

¹⁰ Ibid., pg. 3

Ships are scheduled in port from five and half hours to more than ten hours. Usable port time is less than the actual scheduled port time. Usable port time refers to the time that is available for passengers to take tours, sightsee on their own, shop, and eat in the town. Two factors drive usable port time. The first is the amount of time it takes to unload the ship of passengers; the second is the requirement on all ships that passengers be back on board one-half hour prior to sailing time. In the May 31, 2001 memo to HDR Alaska, Inc. from Klugherz & Associates, *Interim Analysis of Cruise Industry Interviews*, an estimate of one and a half hours of time is lost to unloading and loading a ship tied to the dock.¹¹ The memo also states, “For ships at anchor, the reboarding process is a little slower and often there are long lines to board the lightering craft to return to the vessel.”¹² For this analysis, the figure of one and a half hours lost port time is used as a conservative estimate. Table 2-3 shows usable port time for each of the current port call lengths.

Table 2-3. Usable Port Hours

Length of Port Call in 2001	Usable Port Time	Current Number of Port Calls
6.5 hours or less	<5.0 hours	23
6.6 to 7.5 hours	<6.0 hours	86
7.6 to 8.5 hours	<7.0 hours	142
8.6 to 9.5 hours	<8.0 hours	111
9.6 hours or longer	8.0 or more hours	23
Total Port Calls	--	385

3.0 Effects on Cruise Ship Operations

3.1 General Effects on Cruise Ship Operations

Each Gravina Access Project alternative has varying levels of effects on the cruise ship industry. (Table 3-1) The no-action alternative, (which includes the existing ferry service), along with Alternatives G2, G3, and G4 (improved ferry options), have been determined to have no direct effect on cruise ship operations. It is anticipated that traffic in Tongass Narrows, with respect to cruise ships and ferries, will continue to be regulated in a manner consistent with existing practice.

Each of the bridge alternatives under consideration would have an effect on the cruise industry, ranging from preventing all large ship access to the port facilities except from the north, to limiting access to only a few ships that exceed certain air drafts. More detailed analysis of the effects of each alternative is provided in the next sections.

¹¹ Interim Assessment of Cruise Industry Interviews, memo to HDR Alaska, Inc. from Klugherz & Associates, May 31, 2001, pg. 7.

¹² Ibid., pg. 7.

Table 3-1. Cruise Ship Access to Port Facilities for the GAP Alternatives

Alternative	Description	Impacts
No-action	Existing ferry service	None
C3 (a)	200-foot High Bridge – Airport Area to Signal Road	None
C3 (b)	120-foot High Bridge – Airport Area to Signal Road	No cruise vessel access to/from the north
C4	200-foot High Bridge – Airport Area to Cambria Drive Area	None
D1	120-foot High Bridge – Airport Area	No cruise vessel access to/from the north
F3	Pennock Island Crossing – 60-foot High Bridge & 200-foot High Bridge	Exclusive use of West Channel to the south
G2	Ferry Route from Peninsula Point	None
G3	Ferry Route from Downtown Ketchikan	None
G4	Ferry Route Adjacent to Existing Ferry	None

3.2 Effects of C3a, and C4 (High Bridges)

Alternatives C3(a) and C4 are high bridge alternatives with 200 feet vertical clearance. All cruise ships currently sailing in Alaska will be able to pass under the proposed bridge, as well as those anticipated to sail to Alaska for the foreseeable future. This expectation is based on the ability of all current ships to pass under the cable at Seymour Narrows (180 feet) and the Lion's Gate Bridge (200 feet) at Vancouver, B.C.

The likelihood in the foreseeable future for a ship with an air draft greater than 185 feet to sail to Alaska is low. There are five ships currently in service worldwide that exceed this height, and eight more under construction, for a total of 13 ships with an air draft exceeding 185 feet. With a year-end fleet estimated to be 166 ships in 2004¹³ these 13 ships will represent approximately 8% of the North American cruise fleet.

3.3 Effects of C3(b) and D1 (Low Bridges)

Gravina access alternatives C3(b) and D1 are the 120 feet high bridge alternatives. The air draft for these options precludes any large cruise ships from passing under the bridge structure. The resulting effect is that, unless additional berthing facilities were to be built north of the proposed location for these alternatives, access to the port facilities would be from the south only (either East or West Channels). Based on interviews with cruise line executives and internal Gravina Access Project team analysis, additional sailing time would be required for all large ship cruise itineraries that include Ketchikan. As a result of this additional sailing time and other costs, cruise line executives indicated during detailed interviews that they would look at the possibility of either reducing port time in Ketchikan or dropping Ketchikan as a port altogether.¹⁴ Further detailed analysis was conducted by Glosten Associates to determine how much sailing time would be lost,

¹³ *Cruise Industry News Annual 2001*, Cruise Industry News, 2001, pg. 106.

¹⁴ *Interim Assessment of Cruise Industry Interviews*, Memo to HDR Alaska, Inc. Klugherz & Associates, May 31, 2001

whether ships cruising faster could make up this time, and what the associated costs might be.

Table 3-2 provides an analysis of average time lost on northbound and southbound voyages when ships use the maximum cruising speed. Based on this analysis, “the average time lost on northbound voyages is 0.68 hours (41 minutes) and the average time lost on southbound voyages is 0.99 hours or essentially 60 minutes.”¹⁵

Table 3-2. Analysis of Sailing Time between Juneau and Ketchikan Using Maximum Cruising Speed Alternatives C3(b) and D1 – Low Bridges

2001 Cruise Season	Baseline Hours between KTN/JNU	Average Hours at Max Cruise (knots)	Average Time Lost (hours)	Average Cruising Speed	Full Sea (knots)
Ketchikan to Juneau – 95 trips	16.56	17.23	0.68	20.28	22.54
Juneau to Ketchikan – 94 trips	16.49	17.48	0.99	19.96	22.21

Source: Running Time and Other Impacts on Large Cruise Ships, Fax Memo to HDR Alaska, Inc., Glostien Associates, August 28, 2001

Table 3-3 provides an analysis of how the lost port time affects the length of a port call and usable port time, using the 2001 cruise schedule as a base. Cruise lines want the ships to be in port as long as possible to maximize revenues to the ship and offset the costs of coming to the port. Cruise lines generate considerable revenues from shore excursions sold on board each ship. Therefore, they want to sell as many shore excursions as possible and have time available for the longest excursions. The longest shore excursion in Ketchikan is charter fishing, which is four to five hours depending on the operator. Charter fishing is one of the higher-priced and very popular shore excursions, yielding high revenues for the ship. Further, cruise lines want to sell more than one shore excursion or have several departures times for the same excursion, if possible. If a ship is in a port longer it makes it possible to offer longer and more profitable shore excursions and more departures of shore excursions. Cruise industry executives who were interviewed were of the opinion that four hours of usable port time are necessary for a ship to stop in Ketchikan.

Table 3-3. New Port Call Length – Northbound (NB) and Southbound (SB) Voyages Alternatives C3(b) and D1 – Low Bridges

Length of Port Call in 2001	Current Number of Port Calls	NB	NB	SB	SB
		New Length of Port Call	Usable Port Time	New Length of Port Call	Usable Port Time
6.5 hours or less	23	<5.8 hours	<4.3 hours	<5.5 hours	<4.0 hours
6.6 to 7.5 hours	86	<6.8 hours	<5.3 hours	<6.5 hours	<5.0 hours
7.6 to 8.5 hours	142	<7.8 hours	<6.3 hours	<7.5 hours	<6.0 hours

¹⁵Running Time and Other Impacts on Large Cruise Ships, *Fax Memo to HDR Alaska, Inc., Glostien Associates, August 28, 2001, pg. 5*

Length of Port Call in 2001	Current Number of Port Calls	NB	NB	SB	SB
		New Length of Port Call	Usable Port Time	New Length of Port Call	Usable Port Time
8.6 to 9.5 hours	111	<8.8 hours	<7.3 hours	<8.5 hours	<7.0 hours
9.6 hours or longer	23	9 to 10 hours	8 to 9 hours	9 to 10 hours	8 to 9 hours

During interviews with marine specialists at each cruise line concern was expressed regarding low bridges and the associated operational differences from current operations.

Each marine specialist interviewed indicated that, with a low bridge, Ketchikan would lose port calls and some port time for those ships still calling in Ketchikan. It was difficult for these marine specialists to estimate how many port calls would be lost, although one indicated that they would drop Ketchikan completely, one estimated a 50% loss, and another estimated a 20% loss. Further, all cruise lines interviewed indicated that port time would be reduced in Ketchikan rather than other ports for those ships still stopping in Ketchikan. Ketchikan ranks third, behind Juneau and Skagway, in terms of cruise line port revenue from commissions of on-board sales of shore excursions. Rather than sacrifice port revenue in the top selling ports of Juneau and Skagway, port time would likely be reduced in Ketchikan.¹⁶

Many variables are considered when scheduling a ship for a port, and often these variables change from year to year. This makes it difficult for cruise industry executives to be more specific about just how many port calls might be lost based on time available in an itinerary for the port and from the additional operational considerations (extra sailing time, extra fuel costs, extra tug costs).

In order to develop estimates for port call losses a number of assumptions have been made. Basic assumptions are as follows:

- 2001 is used as the baseline year.
- Northbound and southbound sailing patterns remain constant for the forecast period.
- The probability of lost port calls declines as the number of usable hours increases.

Northbound Sailings: For the high case, it is assumed that all northbound calls with usable port time of less than 4.0 hours would be lost. The one northbound port call in this category under the new scenario has a usable port time of 3.3 hours, too short for the cruise ship to offer a range of shore excursions. A loss of 50% of port calls is applied to port calls with usable port time of less than 5.0 hours. For many cruise lines, this length of usable port time is not enough to meet their targets for revenues. For port calls with usable port time of less than 6.0 hours, the loss is estimated at 25% of port calls. For port

¹⁶ *Interim Assessment of Cruise Industry Interviews*, Memo to HDR Alaska, Inc. from Klugherz & Associates, May 31, 2001, pg. 4.

calls with usable port time of less than 7.0 hours, the loss is projected at 10%. There is no projected loss for port calls with usable port time over 7.0 hours. Total projected loss of port calls in the high case is 24.

For the base case, calls with usable port time of less than 4.0 hours would not be lost. In this case it is assumed that the cruise lines would adjust the schedule to allow adequate time for a Ketchikan port call. Port calls with usable port time of 4.0 hours are projected to lose 25%, while calls with less than 5.0 hours are projected to lose 10%. All other port call lengths are not projected to lose any calls. Total projected loss of port calls in the base case is 8.

For the low case no loss of port calls is projected. For this case it is assumed that cruise lines will make the various adjustments to maintain Ketchikan as a port of call.

Table 3-4. Lost Port Calls – Northbound Sailings Alternatives C3(b) and D1 – 120' Bridges at the Low, Base, and High Cases

Length of Port Call in 2001	Current Number of Port Calls	Usable Port Time w/Reduced Port Call (round down)	Lost Port Calls NB		
			Low Case (least lost port calls)	Base Case	High Case (most lost port calls)
6.5 hours or less	1	<4.0 hours	0	0	1
6.6 to 7.5 hours	7	4.0 hours	0	2	4
7.6 to 8.5 hours	62	5.0 hours	0	6	16
8.6 to 9.5 hours	25	6.0 hours	0	0	3
9.6 hours or longer	9	7.0 hours	0	0	0
Total Port Calls	104		0	8	24

Southbound Sailings: For the high case, it is assumed that 50% of port calls with usable port time of less than 4.0 hours are lost. Similarly, a loss of 50% of port calls is applied to port calls with usable port time of 4.0 hours. For many cruise lines, this length of usable port time is not enough to meet their targets for revenues. For port calls with usable port time of less than 5.0 hours, the estimated loss is 25% of these calls. For port calls with usable port time of less than 6.0 hours or less, the loss is projected at 10%. There is no projected loss for port calls with usable port time of 7.0 hours or more. Total projected loss of port calls in the high case is 80.

For the base case, it is assumed that 25% port calls with usable port time of less than 4.0 hours are lost. Port calls with a usable port time of 4.0 hours in port are also projected to lose 25%, calls with less than 5.0 hours in port, 10%. All other port call lengths are not projected to lose any calls. Total projected loss of port calls in the base case is 34.

For the low case no loss of port calls is projected. For this case it is assumed that cruise lines will make the various adjustments to maintain Ketchikan as a port of call.

Table 3-5. Lost Port Calls – Southbound Sailings Alternatives C3(b) and D1 – 120' Bridges at the Low, Base, and High Cases

Length of Port Call in 2001	Current Number of Port Calls	Usable Port Time w/Reduced Port Call (round down)	Lost Port Calls SB		
			Low Case (least lost port calls)	Base Case	High Case (most lost port calls)
6.5 hours or less	22	<4.0 hours	0	6	11
6.6 to 7.5 hours	79	4.0 hours	0	20	40
7.6 to 8.5 hours	80	5.0 hours	0	8	20
8.6 to 9.5 hours	86	6.0 hours	0	0	9
9.6 hours or longer	14	7.0 hours	0	0	0
Total Port Calls	281		0	34	80

Table 3-6 summarizes the total lost port calls for these scenarios. Port calls lost as a percent of the total 2001 port calls is 27% for the high case, 11% for the base case and 0% for the low case.

Table 3-6. Total Lost Port Calls Alternatives C3(b) and D1 – 120' Bridges at the Low, Base & High Cases (with 2001 as base year)

	Low Case	Base Case	High Case
Total Port Calls in 2001	385	385	385
Northbound Port Calls Lost	0	8	24
Southbound Port Calls Lost	0	34	80
Total Port Calls Lost	0	42	104
Revised Port Calls Using 2001 as Base	385	343	281
Port Calls Lost as % of Total 2001 Port Calls	0%	11%	27%

For the ships that continue to visit Ketchikan, port time is estimated to be reduced on average 0.68 hours (41 minutes) for northbound sailings and 0.99 hours (one hour) for southbound sailings. Applying these estimates to northbound and southbound sailings, total lost port time is 352 hours in the low case, 313 hours in the base case and 256 hours in the high case.

Table 3-7. Total Lost Port Time for Alternatives C3(b) and D1 – 120' Bridges at the Low, Base & High Cases (with 2001 as base year)

	Low Case	Base Case	High Case
Total Port Calls After Losses	385	343	281
Northbound Port Calls After Losses	104	96	80
Northbound Port Time Lost (41 minutes/call)	71.0 hours	65.6 hours	54.7 hours
Southbound Port Calls After Losses	281	247	201
South Port Time Lost (1 hour lost/call)	281.0 hours	247.0 hours	201.0 hours
Total Port Time Lost	352.0 hours	312.6 hours	255.7 hours

Another effect of the additional sailing time is the added cost of fuel for the additional sailing time and the additional power needed to cruise at the maximum cruising speed. Table 3-8 provides an analysis of the additional fuel and estimated cost for the trip between Ketchikan and Juneau.

Table 3-8. Additional Fuel and Associated Costs for Alternatives C3(b) and D1 – 120' Bridges

	Northbound	Southbound
Estimated Extra Fuel Needed (Average/Sailing)	4,594 Gallons	2,712 Gallons
Estimated Cost Per Gallon	\$1.00	\$1.00
Estimated Additional Cost Per Sailing	\$4,594	\$2,712

Source: Running Time and Other Impacts on Large Cruise Ships, Fax Memo to HDR Alaska, Inc., Glosten Associates, August 28, 2001

Using a weighted average of northbound (104) and southbound (281) sailings, the total average estimated additional fuel cost per sailing is \$3,222. Using the revised port call figure, after losses, and assuming all remaining ships will need to travel the additional 30.5 nautical miles, the cost for the additional sailing time and increased speed can be calculated for each scenario. This assumes that the cruise line elects to minimize the port time lost by cruising between Ketchikan and Juneau at maximum cruising speed.

Table 3-9. Additional Fuel Costs for Alternatives C3(b) and D1 – 120' Bridges

	Low Case	Base Case	High Case
Revised Port Calls Using 2001 as a Base	385	343	281
Estimated Average Additional Cost Per Port Call	\$3,222	\$3,222	\$3,222
Total Estimated Additional Fuel Cost (rounded)	\$1,240,500	\$1,105,100	\$905,400

Another effect of these alternatives is the need to have tugboats available to assist ships maneuvering within Tongass Basin. Cruise ship masters who responded to a survey indicated that the type of tugs needed to assist ships with the necessary maneuvering need to have 3000HP or more. At present there are no tugs with this power in Ketchikan.¹⁷ The cost of the tug assists necessary is estimated at \$2,500 for each call out.¹⁸

For purposes of this analysis, the following assumptions have been made:

- Most, if not all, cruise ships would arrive and depart using East Channel.
- Most cruise ships (90%) would require one tug assist to make the 180-degree turn necessary to depart via East Channel. The remaining 10% would have Azipod or similar (i.e. 360 degree rotatable, podded propulsion) systems. This 180-degree turn could be made either prior to docking, where the ship would be turned to be starboard side to the dock, or after the ship has undocked and is ready to depart Ketchikan.

¹⁷ *Cruise Ship Master Interview Summary*, Memo to HDR Alaska, Inc from Klugherz & Associates, September 8, 2001, pg. 1.

¹⁸ Email correspondence to Klugherz & Associates from Glosten Associates, November 21, 2001.

Table 3-10 provides the total costs of these assumptions. The current cost of tug assists, if any, have not been factored into these numbers. Further, these costs are provided for illustration only, as if a bridge were in place today.

Table 3-10. Tugboat Assistance Alternatives C3(b) and D1 – 120' Bridges

	Low	Base	High
Total Port Calls in 2001	385	343	281
Tug Assists 90% of time	347	309	253
Cost per call out	\$2 500	\$2 500	\$2 500
Total Cost (one assist)	\$ 867,500	\$772,500	\$632,500

Table 3-11 summarizes the effects on cruise ship operations from Gravina Access Project alternatives C3(b) and D1.

Table 3-11. Summary of Effects on Cruise Ship Operations Alternatives C3(b) and D1 – 120' Bridges

	Low Case	Base Case	High Case
Lost Port Calls	0	42	104
Lost Port Calls as Percent of Total	0%	11%	30%
Total Additional Fuel Costs	\$1,240,500	\$1,105,100	\$905,400
Total Cost of Tug Assists	\$ 867,500	\$772,500	\$632,500

3.4 Effects of F3 (Pennock Island Crossing)

Alternative F3 includes a 60-foot high bridge over East Channel and a 200-foot high bridge over West Channel, the southern approaches to Ketchikan cruise ship facilities. This alternative would require the exclusive use of West Channel for all cruise ships. Current usage of West Channel by large cruise ships is estimated at 10 times per season. East Channel is the preferred approach to the cruise ship docks, as it is in nearly direct alignment, while West Channel requires maneuvering in Tongass Basin to berth.

When interviewed, cruise line executives and ships masters were generally uncomfortable with the use of West Channel exclusively. As a matter of company policy, some cruise lines do not allow their ships to use West Channel. The primary concern mentioned was the additional time needed to maneuver into and out of the channel.¹⁹

An analysis was conducted by Glosten Associates, Inc. to assess the effects of alternative F3, where East Channel was blocked to large cruise ships by a 60-foot bridge and West Channel was the alternative passage. Assuming that cruise ships would use West Channel, the resulting sailing time differential is analyzed in Table 3-12.

¹⁹ *Interim Assessment of Cruise Industry Interviews*, Memo to HDR Alaska, Inc. Klugherz & Associates, May 31, 2001

Presuming a low bridge across East Channel south of the existing Ketchikan cruise ship docks and a willingness by large cruise ships to use West Channel adds approximately 1.8 n.m. to the running distance and cruise ships would have to execute the equivalent of two 180° turns that is currently not required, adding 30 to 40 minutes to their harbor maneuvers.²⁰

The average time lost on northbound voyages is a negligible 0.05 hours (3 minutes) and the average time lost on southbound voyages is 0.30 hours (18 minutes).²¹ It is important to note that the time lost is actually much greater than 3 minutes or 18 minutes but due to faster running speeds between Juneau and Ketchikan much of the time can be made up. These faster running speeds consume more fuel resulting in increased fuel costs.

Table 3-12. Analysis of Sailing Time between Juneau and Ketchikan for Alternative F3 – Pennock Island Crossing

2001 Cruise Season	Baseline Hours between KTN/JNU	Average Hours at Max Cruise (knots)	Average Time Lost (hours)	Average Cruising Speed	Full Sea (knots)
Ketchikan TO Juneau – 95 trips	16.56	16.60	0.05	20.01	22.54
Juneau TO Ketchikan – 94 trips	16.49	16.79	0.30	19.76	22.21

Source: Running Time and Other Impacts on Large Cruise Ships, Fax Memo to HDR Alaska, Inc., Glosten Associates, August 28, 2001.

Table 3-13 provides an analysis of the lost port time resulting from the assumption that large ships would use West Channel to access the port facilities in Ketchikan. The new length of port call is calculated by subtracting the additional sailing time needed to meet this itinerary. Usable port time is calculated using the new length of port call less one and a half hours for debarking and embarking the ship. For northbound sailings, the loss of port time is calculated as three minutes, therefore, the new length of port calls for northbound sailings remains the same. For southbound sailings the length of port call is reduced by 0.30 hours (18 minutes).

Table 3-13. Port Call Length – Northbound/Southbound Voyages

Length of Port Call in 2001	Current Number of Port Calls	NB	NB	SB	SB
		New Length of Port Call	Usable Port Time	New Length of Port Call	Usable Port Time
6.5 hours or less	23	<6.5 hours	<5.0 hours	<6.2 hours	<4.7 hours
6.6 to 7.5 hours	86	<7.5 hours	<6.0 hours	<7.2 hours	<5.7 hours
7.6 to 8.5 hours	142	<8.5 hours	<7.0 hours	<8.2 hours	<6.7 hours
8.6 to 9.5 hours	111	<9.5 hours	<8.0 hours	<9.2 hours	<7.7 hours
9.6 hours or longer	23	Same	8 to 10 hours	9 to 10 hours	8 to 9 hours

²⁰ Running Time and Other Impacts on Large Cruise Ships, *Fax Memo to HDR Alaska, Inc., Glosten Associates, August 28, 2001.*

²¹ *Ibid.*, pg.7. The acronym “n.m.” refers to nautical miles.

Many variables are considered when scheduling a ship for a port, and often these variables change from year to year. This makes it difficult for cruise industry executives to be more specific about just how many port calls might be lost based on time available in an itinerary for the port and from the additional operational considerations (extra sailing time, extra fuel costs, extra tug costs).

In order to develop estimates for port call losses a number of assumptions have been made. Basic assumptions are as follows:

- 2001 is used as the baseline year.
- Northbound and southbound sailing patterns remain constant through the forecast period.
- The probability of lost port calls declines as the number of usable port hours is increased.

Further, there is some risk associated with the use of West Channel, in part because of the geographic nature of the channel. As a result, some lines may not use West Channel to access Ketchikan. Some may choose to access the port from the north only and others may choose to reduce the number of calls to the port.

Northbound Sailings: In all cases on northbound sailings, it is assumed that the loss of three minutes of port time is not enough to deter ships from visiting Ketchikan. The issue of whether ships would use West Channel has been used as the primary variable in this analysis.

For the high case, it is assumed that some cruise lines would choose to bypass Ketchikan rather than use West Channel or take the extra time and cost necessary to access the port facilities from the north. This is based on cruise line interviews where some cruise lines indicated that they would not use West Channel to access Ketchikan. In this scenario, ships that would choose to bypass Ketchikan include all ships with less than 4.0 hours of usable port time, 25% of ships with 4.0 hours of usable port time, and 10% of ships with 5.0 hours of usable port time. The resulting projected loss is 9 port calls.

For the base case, projected losses total one port call.

For the low case, it is assumed that all northbound ships would use West Channel and continue to visit Ketchikan. Therefore, no loss is projected for the low case.

**Table 3-14. Lost Port Calls – Northbound Sailings Low, Base, and High Cases-
Alternative F3**

Length of Port Call in 2001	Current Number of Port Calls	Usable Port Time w/Reduced Port Call (round down)	Lost Port Calls NB		
			Low Case (least lost port calls)	Base Case	High Case (most lost port calls)
6.5 hours or less	1	<4.0 hours	0	0	1
6.6 to 7.5 hours	7	4.0 hours	0	1	2

Length of Port Call in 2001	Current Number of Port Calls	Usable Port Time w/Reduced Port Call (round down)	Lost Port Calls NB		
			Low Case (least lost port calls)	Base Case	High Case (most lost port calls)
7.6 to 8.5 hours	62	5.0 hours	0	0	6
8.6 to 9.5 hours	25	6.0 hours	0	0	0
9.6 hours or longer	9	7.0 hours	0	0	0
Total Port Calls	104		0	1	9

Southbound Sailings: In all cases on southbound sailings, it is assumed that the loss of 18 minutes of port time is not enough to deter ships from visiting Ketchikan. The issue of whether ships would use West Channel has been used as the primary variable in this analysis.

For the high case, it is assumed that some cruise lines would choose to bypass Ketchikan rather than use West Channel or take the extra time and cost necessary to access the port facilities from the north. This is based on cruise line interviews where some cruise lines indicated that they would not use West Channel to access Ketchikan. In this scenario, ships that would choose to bypass Ketchikan include 50% of ships with less than 4.0 hours of usable port time, 25% of ships with 4.0 hours of usable port time, and 10% of ships with 5.0 hours of usable port time. The resulting projected loss is 39 port calls.

For the base case, it is assumed that 25% of ships with less than 4.0 hours of usable port time and 10% of ships with 4.0 hours of usable port time would choose to bypass Ketchikan. The resulting projected loss is 14 port calls.

For the low case, it is assumed that all northbound ships would use West Channel and continue to visit Ketchikan. Therefore, no loss is projected for the low case.

Table 3-15. Lost Port Calls – Southbound Sailings - Low, Base, and High Cases – Alternative F3

Length of Port Call in 2001	Current Number of Port Calls	Usable Port Time w/Reduced Port Call (round down)	Lost Port Calls SB		
			Low Case (least lost port calls)	Base Case	High Case (most lost port calls)
6.5 hours or less	22	<4.0 hours	0	6	11
6.6 to 7.5 hours	79	4.0 hours	0	8	20
7.6 to 8.5 hours	80	5.0 hours	0	0	8
8.6 to 9.5 hours	86	6.0 hours	0	0	0
9.6 hours or longer	14	7.0 hours	0	0	0
Total Port Calls	281		0	14	29

Table 3-16 summarizes the total lost port calls for this scenario. Port calls lost as a percentage of the total 2001 port calls is 12% for the high case, 4% for the base case, and 0% for the low case.

Table 3-16. Total Lost Port Calls Low, Base & High Cases – Alternative F3

	Low Case	Base Case	High Case
Total Port Calls in 2001	385	385	385
Northbound Port Calls Lost	0	1	9
Southbound Port Calls Lost	0	14	39
Total Port Calls Lost	0	15	48
Revised Port Calls Using 2001 as Base	385	370	337
Port Calls Lost as % of Total 2001 Port Calls	0%	4%	12%

For the ships that continue to visit Ketchikan, the reduction in port time is estimated to average 0.05 hours (3 minutes) for northbound sailings and 0.30 hours (18 minutes) for southbound sailings. Applying these estimates to northbound and southbound sailings, total lost port time is 90 hours in the low case, 85 hours in the base case and 77 hours in the high case.

Table 3-17. Total Lost Port Time Low, Base & High Cases – Alternative F3

	Low Case	Base Case	High Case
Total Port Calls After Losses	385	370	337
Northbound Port Calls After Losses	104	103	95
Northbound Port Time Lost (3 minutes/call)	5.2 hours	5.2 hours	4.8 hours
Southbound Port Calls After Losses	281	267	242
South Port Time Lost (18 minutes/call)	84.3 hours	80.1 hours	72.6 hours
Total Port Time Lost	89.5 hours	85.3 hours	77.4 hours

Another effect of the additional sailing and maneuvering time is the added cost of fuel for the additional sailing time and the additional power needed to cruise at the maximum cruising speed. Table 3-18 provides an analysis of the additional fuel and estimated cost for the trip between Ketchikan and Juneau for the use of West Channel.

Table 3-18. Additional Fuel and Associated Costs Alternative F3 – Pennock Island Crossing

	Northbound	Southbound
Estimated Extra Fuel Needed (Average/Sailing)	3,579	2,055
Estimated Cost Per Gallon	\$1.00	\$1.00
Estimated Additional Cost Per Sailing	\$3,579	\$2,612

Source: Running Time and Other Impacts on Large Cruise Ships, Fax Memo to HDR Alaska, Inc., Glosten Associates, August 28, 2001

Using a weighted average of northbound (104) and southbound (281) sailings, the total average estimated additional fuel cost per sailing is \$2,467. Using the revised port call figure, after losses, and assuming all remaining ships will need to travel the additional 1.8 nautical miles, the cost for the additional sailing time and increased speed can be calculated for each scenario. This assumes that the cruise line elects to minimize the port time lost by cruising between Ketchikan and Juneau at maximum cruising speed.

Table 3-19. Additional Fuel Costs Alternative F3 – Pennock Island Crossing

	Low Case	Base Case	High Case
Revised Port Calls Using 2001 as a Base	385	370	337
Estimated Average Additional Cost Per Port Call	\$2,467	\$2,467	\$2,467
Total Estimated Additional Fuel Cost (rounded)	\$949,800	\$912,800	\$831,400

Another effect of these alternatives is the need to have tugboats available to assist ships maneuvering within Tongass Basin. Cruise ship masters who responded to a survey indicated that the type of tugs needed to assist ships with the necessary maneuvering need to have 3000HP or more. At present there are no tugs with this power in Ketchikan.²² The cost of the tug assists necessary is estimated at \$2,500 for each call out.²³

For purposes of this analysis, the following assumptions have been made:

- Most, if not all, cruise ships would use West Channel either when arriving in Ketchikan or when departing.
- Most cruise ships (90%) would require a tug escort around Pennock Reef to access West Channel. The remaining 10% would have Azipod or similar (i.e. 360 degree rotatable podded propulsion) systems.
- Most cruise ships (90%) would require a tug assist to make the 180 degree turn necessary to line up for departure. For northbound ships, this requires a 180-degree turn either prior to docking or upon departure. For southbound ships, the turn most likely will occur upon departure, when the tug is needed to round Pennock Reef.

Table 3-20 provides the total costs of these assumptions. The current cost of tug assists, if any, have not been factored into these numbers. Further, these costs are provided for illustration only, if a bridge were in place today.

Table 3-20. Tugboat Assistance Alternative F3 – Pennock Island Crossing

	Low	Base	High
Total Port Calls in 2001	385	370	337
Tug Assists 90% of time	347	333	303
Cost per call out	\$2 500	\$2 500	\$2 500
Total Cost (one assist)	\$867,500	\$832,500	\$757,500

²² *Cruise Ship Master Interview Summary*, Memo to HDR Alaska, Inc from Klugherz & Associates, September 8, 2001, pg. 1

²³ Email correspondence to Klugherz & Associates from Glostien Associates, November 21, 2001.

Table 3-21 summarizes the effects on cruise ship operations from Gravina access alternative F3, with the assumption that large cruise ships would use West Channel.

Table 3-21. Summary of Effects of Alternative F3

	Low Case	Base Case	High Case
Lost Port Calls	0	15	48
Lost Port Calls as Percent of Total	0%	4%	12%
Total Additional Fuel Costs	\$949,800	\$912,800	\$831,400
Total Cost of Tug Assists	\$867,500	\$832,500	\$757,500

4.0 Effects on Passenger Activities and Other Revenues

4.1 Background

Cruise ship-related spending on shore is found in three forms. The first is the spending by cruise ship passengers for tours, sightseeing, gifts, souvenirs, food and beverages. The second form of spending involves the purchases made by cruise ship crews. The third form is direct spending by the cruise line itself for docking, tugs, pilots, and miscellaneous supplies. The following subsection illustrates the estimated spending by cruise ship passengers, crews and cruise lines based on 1999 data.

4.1.1 Cruise Ship-Related Spending On Shore

Based on a study completed for the Southeast Conference in 2000, cruise ship passengers were estimated to spend, on average, per port call in Ketchikan \$95 per person. Cruise ship crews were estimated to spend \$15 per person, and cruise lines a total of \$22,100 per visit. Using the average capacity per ship in 2001 for passengers and crew, the total value of a cruise ship call is calculated at \$191,080.

Table 4-1. Estimate of Cruise Ship-Related Spending Per Port Call

	Average Passengers Per Ship	Average Spending	Total Spending/Call
Cruise Ship Passengers	1,662	\$95	\$158,080
Cruise Ship Crew	727	\$15	\$ 10,900
Cruise Line Spending	--	--	\$ 22,100
Total			\$191,080

Source: Economic Impact of Cruise Line Spending in Southeast Alaska in 1999, Southeast Conference.2000.

4.2 Effects of Passenger Activities and Other Revenues

4.2.1 Effects on Passenger Activities and Other Revenues of No-action, G2, G3 and G4 Alternatives

There are no effects on passenger activities and other revenues as a result of alternatives G2, G3, and G4. It is anticipated that traffic in Tongass Narrows will continue to function as it currently does for the foreseeable future.

4.2.2 Effects on Passenger Activities and Other Revenues of C3(a) and C4

These two alternatives are of sufficient vertical clearance to permit the passage of large cruise ships and, therefore, there is no loss of projected port calls or usable port time. As a result, there are no anticipated effects on passenger activities and other revenues.

4.2.3 Effects on Passenger Activities and Other Revenues of C3(b) and D1 – Low Bridges

The effects of the low bridge alternatives on passenger activities and other revenues are greater than any other alternative. Table 4-2 demonstrates the potential revenue losses resulting from alternatives C3(b) and D1. In each case, the value of a cruise ship call is \$191,080.

The potential annual revenue losses resulting from lost port calls for the alternatives C3(b) and D1 range from just over \$4 million in the low case to \$20 million in the high case, using 2001 as a base year.

Table 4-2. Potential Revenue Losses Low, Base, and High Cases – Alternatives C3b and D1

	Low Case	Base Case	High Case
Northbound Sailings			
Lost Port Calls	0	8	24
Potential Lost Revenue	\$0	\$1,529,000	\$4,586,000
Southbound Sailings			
Lost Port Calls	0	34	80
Potential Lost Revenue	\$0	\$6,497,000	\$15,286,000
Total			
Lost Port Calls	0	42	104
Potential Lost Revenue	\$0	\$8,025,000	\$19,872,000

While information exists on average passenger spending per port call in Ketchikan, there is no current information available on passenger spending per hour that a ship is in port. Spending by cruise passengers will vary by ship, by length of time in port, by direction of the cruise (i.e. northbound versus southbound), and other factors such as poor weather.

In order to assess the potential effects of lost port time by those ships visiting Ketchikan, a number of assumptions have been made about spending by usable hours in port. Assuming that passenger spending varies by hour, with more spending occurring early in

the port call than later, and that the shore excursion spending is counted in the first hour, an estimate can be made of spending by hour. For ships with longer usable port time it is assumed that the second wave of shore excursion spending is reflected in the fourth hour. Using these assumptions, Table 4-3 provides an estimate of passenger spending while in port.

Table 4-3. Estimated Passenger Spending by Hour

	Usable Port Time				
	<5.0 hours	<6.0 hours	<7.0 hours	<8.0 hours	8.0 or more
Hour					
1	55%	55%	50%	40%	40%
2	25%	20%	15%	10%	10%
3	15%	15%	15%	10%	10%
4	5%	5%	10%	20%	20%
5	-	5%	5%	10%	10%
6			5%	5%	5%
7				5%	5%
8+					
Total	100%	100%	100%	100%	100%

Table 4-4 applies these spending estimates per hour to the average passenger spending, assuming the average passenger spends \$95 per port call.

Table 4-4. Estimated Passenger Spending by Hour

	Usable Port Time				
	<5.0 hours	<6.0 hours	<7.0 hours	<8.0 hours	8.0 or more
Hour					
1	\$52.25	\$52.25	\$47.50	\$38.00	\$38.00
2	\$23.75	\$19.00	\$14.25	\$9.50	\$9.50
3	\$14.25	\$14.25	\$14.25	\$9.50	\$9.50
4	\$4.75	\$4.75	\$9.50	\$19.00	\$19.00
5		\$4.75	\$4.75	\$9.50	\$9.50
6			\$4.75	\$4.75	\$4.75
7				\$4.75	\$4.75
8+					
Total	\$95.00	\$95.00	\$95.00	\$95.00	\$95.00

To calculate potential passenger revenue losses further assumptions were made. These losses were calculated by using total port calls remaining for each usable port hour category and by using the assumption that the last hour of spending calculated in the above table would be lost in each scenario, except for those passengers with eight or more hours of usable port time. These calculations used the average number of passengers per port call (1,662), times the number of port calls, times the amount lost to develop the final figures. For example, in the high case, one port call remained in the lowest usable port time category (less than four hours). This port call was multiplied by the average number of passengers (1,662) and the estimated amount of spending in the

fourth hour (\$4.25). The result for the less than four-hour category is \$7,064 of lost spending. This formula was applied to each hour for each case. The resulting calculations are found in Table 4-5.

In the table the high case reflects \$2 million in lost revenue, the base case \$2.5 million, and the low case approximately \$2.9 million. In this analysis, the high case actually reflects the least amount of spending lost, because it reflects the lowest number of reduced-time port calls. These port calls were calculated in section 3.3 *Effects of C3(b) and D1*, and the cases were based on the number of port calls lost. Hence, in the high case, the greatest number of port calls were lost, leaving the fewest number of port calls. Because the port calls are fewer, the total number of lost hours is fewer and the total revenue loss is lower.

Table 4-5. Passenger Revenue Losses with Reduced Port Time for Alternatives C3(b) and D1

	Low Case	Base Case	High Case
Port Calls After Losses	385	343	281
Total Revenue Losses	\$2,858,000	\$2,526,000	\$2,037,000
Revenue Losses Per Port Call	\$7,423	\$7,365	\$7,248
Revenue Losses Per Passenger	\$4.47	\$4.43	\$4.36

Table 4-6 summarizes the effects on passenger and other revenues using 2001 as a baseline year. The high case reflects a nearly \$22 million loss, the base case a \$10.5 million loss, and the low case an estimated \$2.9 million loss from these alternatives.

**Table 4-6. Summary – Passenger and Other Revenue Losses
2001 Base Year - Alternatives C3(b) and D1**

	Low Case	Base Case	High Case
Total Lost Revenue from Lost Port Calls	\$0	\$8,025,000	\$19,872,000
Lost Revenue from Reduced Port Hours	\$2,858,000	\$2,526,000	\$2,037,000
TOTAL LOST REVENUE	\$2,858,000	\$10,552,000	\$21,909,000

4.2.4 Effects on Passenger Activities and Other Revenues of F3

Passenger activities and other revenues will be affected by alternative F3. Table 4-7 demonstrates the potential revenue losses resulting from this alternative. In each case, the value of a cruise ship call remains constant at \$191,080.

The potential revenue losses resulting from lost port calls for this alternative range from no losses in the low case to \$2.9 million in the base case and \$9.2 million in the high case, using 2001 as the base year.

Table 4-7. Potential Revenue Losses Alternative F3 – Pennock Island Crossing

	Low Case	Base Case	High Case
Northbound Sailings			
Lost Port Calls	0	1	9
Potential Lost Revenue	\$0	\$191,080	\$1,729,700
Southbound Sailings			
Lost Port Calls	0	14	39
Potential Lost Revenue	\$0	\$2,675,000	\$7,452,000
Total			
Lost Port Calls	0	15	48
Potential Lost Revenue	\$0	\$2,866,000	\$9,172,000

To calculate potential passenger revenue losses, the assumptions regarding passenger spending per hour were used from section 4.2.3. In addition, further assumptions were made. These losses were calculated by using total port calls remaining for each usable port hour category and using the assumption that the last hour of spending calculated in the Estimated Passenger Spending by Hour Table (Table 4-3) would be lost in each scenario, except for those passengers with eight or more hours of usable port time. These calculations used the average number of passengers per port call (1,662), times the number of port calls, times the amount lost to develop the final figures. For example, in the high case, one port call remained in the lowest usable port time category (less than four hours). This port call was multiplied by the average number of passengers (1,662) and the estimated amount of spending in the fourth hour (\$4.25). The result for the less than four-hour category is \$7,064 of lost spending per port call. This formula was applied to each hour for each case. The resulting calculations are found in Table 4-8.

In the table the high case reflects \$1.8 million in lost revenue, the base case \$2 million, and the low case \$2.1 million. In this analysis, the high case actually reflects the least amount of spending lost, because it reflects the lowest number of port calls. These port calls were calculated in section 3.4 *Effects of F3* and the cases were based on the number of port calls lost. Hence, in the high case, the greatest number of port calls were lost, leaving the fewest number of reduced-time port calls. Because the port calls are fewer, the total revenue loss is lower.

Table 4-8. Passenger Revenue Losses with Reduced Port Time Alternative F3- Pennock Island Crossing

	Low Case	Base Case	High Case
Port Calls After Losses	385	370	337
Revenue Losses	\$2,108,000	\$1,997,000	\$1,800,000
Revenue Losses Per Port Call	\$5,475	\$5,398	\$5,432
Revenue Losses Per Passenger	\$3.29	\$3.25	\$3.21

Table 4-9 summarizes the effects on passenger and other revenue using 2001 as a baseline year. The high case reflects \$11.0 million loss, the base case a \$4.9 million loss, and the low case a \$2.1 million loss from this alternative.

**Table 4-9. Summary – Passenger and Other Revenue Losses Alternative F3 –
Pennock Island Crossing**

	Low Case	Base Case	High Case
Total Lost Revenue from Lost Port Calls	\$0	\$2,866,200	\$9,171,800
Lost Revenue from Reduced Port Hours	\$2,107,800	\$1,997,300	\$1,799,900
Total Lost Revenue	\$2,107,800	\$4,863,500	\$10,971,700

5.0 References

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